

Surname					Other Names				
Centre Number					Candidate Number				
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General Certificate of Education
January 2004
Advanced Level Examination



BIOLOGY (SPECIFICATION B) Unit 8 Section A Behaviour and Populations

BYB8/A

Tuesday 27 January 2004 9.00 am to 11.15 am

In addition to this paper you will require:

- Section B provided as an insert (enclosed);
- a ruler with millimetre measurements.

You may use a calculator.

For Examiner's Use			
Number	Mark	Number	Mark
1			
2			
3			
4			
5			
6			
7			
Total (Column 1)		→	
Total (Column 2)		→	
TOTAL			
Examiner's Initials			

Time allowed: The total time for Section A and Section B of this paper is 2 hours 15 minutes.

Instructions

- Use blue or black ink or ball-point pen.
- Fill in the boxes at the top of this page.
- Answer **all** the questions in **Section A** in the spaces provided. All working must be shown.
- **Section A** and **Section B** will be marked by different examiners. You must ensure that any supplementary sheets are fastened to the appropriate question paper answer book.
- Do all rough work in this book. Cross through any work you do not want marked.

Information

- The maximum mark for **Section A** is 50.
- Mark allocations are shown in brackets.
- You are reminded of the need for clear presentation in your answers. All answers should be in good English and should use accurate scientific terminology.
- You are advised to spend 1 hour on **Section A**.
- You are reminded that **Section A** requires you to use your knowledge of Modules 1-5 as well as Module 8 in answering synoptic questions. These questions are indicated by the letter **S**.

SECTION A

Answer **all** questions in the spaces provided.

- 1 (a) Complete the table to show **two** differences between innate behaviour and learned behaviour.

Innate behaviour	Learned behaviour
1	
2	

(2 marks)

- (b) Pavlov investigated learning behaviour in dogs. The results of one of his investigations are summarised in the table below.

	Stimulus	Response
Initial situation	Ringing bell	No response
	Food in mouth	Salivation
After learning had taken place	Ringing bell	Salivation

- (i) What type of learning had taken place?

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(1 mark)

- (ii) Describe how Pavlov brought about this type of learning in the dog.

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(2 marks)

Turn over ►

- 2 (a) Describe and explain **two** ways in which the structure of the placenta is adapted to its functions.

1

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2

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(2 marks)

During pregnancy, a woman's body mass increases by 12 kg. The table shows the various components of this increase in mass.

Component	Increase in mass during pregnancy/kg
Stores of fat, protein and other nutrients in mother	3.0
Mother's blood	2.0
Breasts	1.0
Uterus	1.0
Fetus	3.3
Placenta	0.7
X	1.0

- (b) The increase in the mother's blood mass is due to an increase in both the volume of plasma and the total mass of red blood cells.

- (i) Explain how the extra volume of plasma is used.

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(1 mark)

- S** (ii) Explain why the mother may need to change her diet to enable the increase in the total mass of red blood cells to occur.

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(1 mark)

- (c) Identify component **X**.

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(1 mark)

3 The table shows the age range at which various events in puberty occurred in a large sample of females and males.

Event	Age range over which event occurred/years
Height spurt (females)	9.5 – 14.5
Height spurt (males)	10.5 – 16.5
First menstrual period	10.5 – 16.0
Breasts start to develop	8.0 – 13.0
Rate of growth of penis increases	10.5 – 14.5
Rate of growth of testes increases	9.5 – 13.5

(a) Which hormone is mainly responsible for

(i) the height spurt in both females and males;

.....

(ii) development of breasts?

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(2 marks)

(b) From the information in the table

(i) by what age had all the girls completed puberty;

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(ii) by what age had puberty started in all the boys?

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(2 marks)

S (c) Adult height shows continuous variation. Describe the causes of this variation.

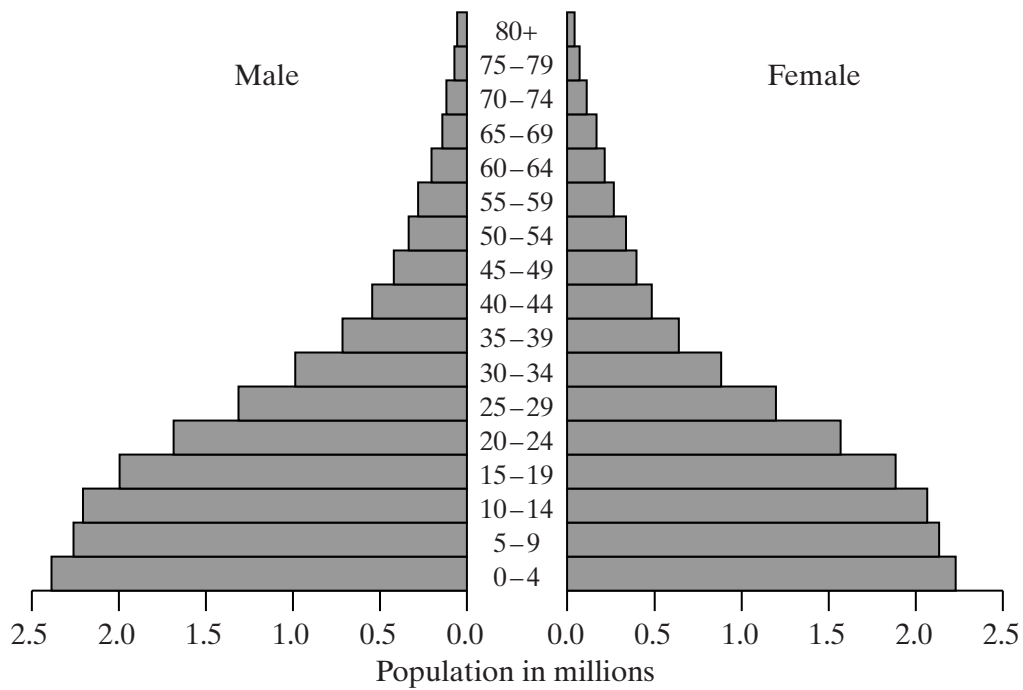
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(3 marks)

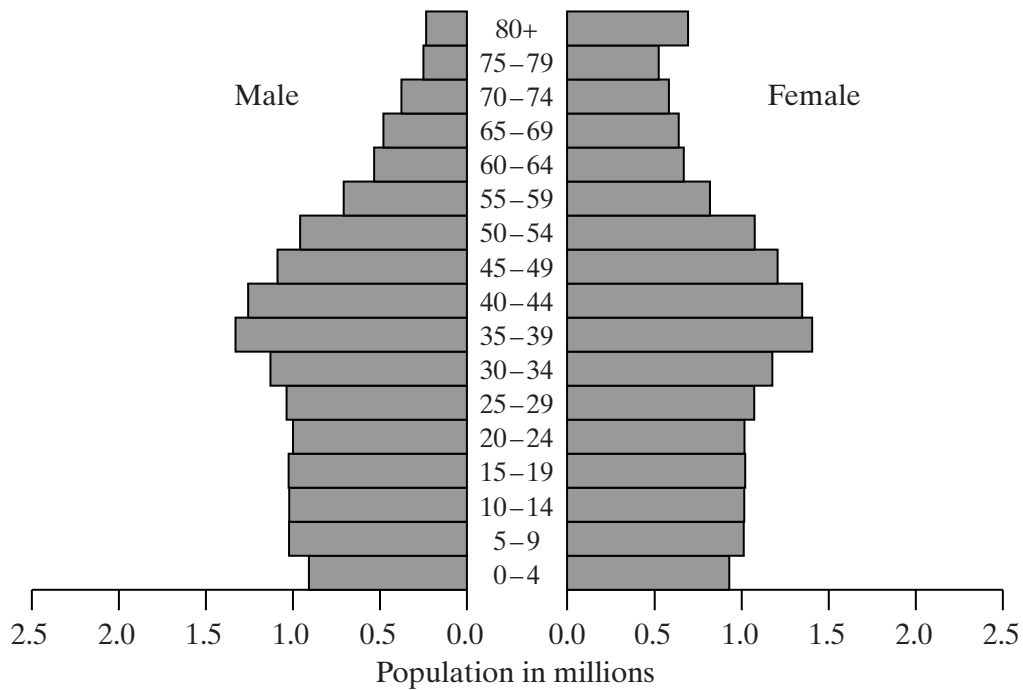
Turn over ▶



- 4 (a) The population pyramids show the age distribution in two countries in 2000.



Country A



Country B

(i) Describe the pattern of age distribution in each country.

Country A

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.....

Country B

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(2 marks)

(ii) The population size of the two countries is about the same. In which country is the population growing more rapidly? Explain your answer.

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(1 mark)

(b) What information is required in order to calculate the growth rate of a population?

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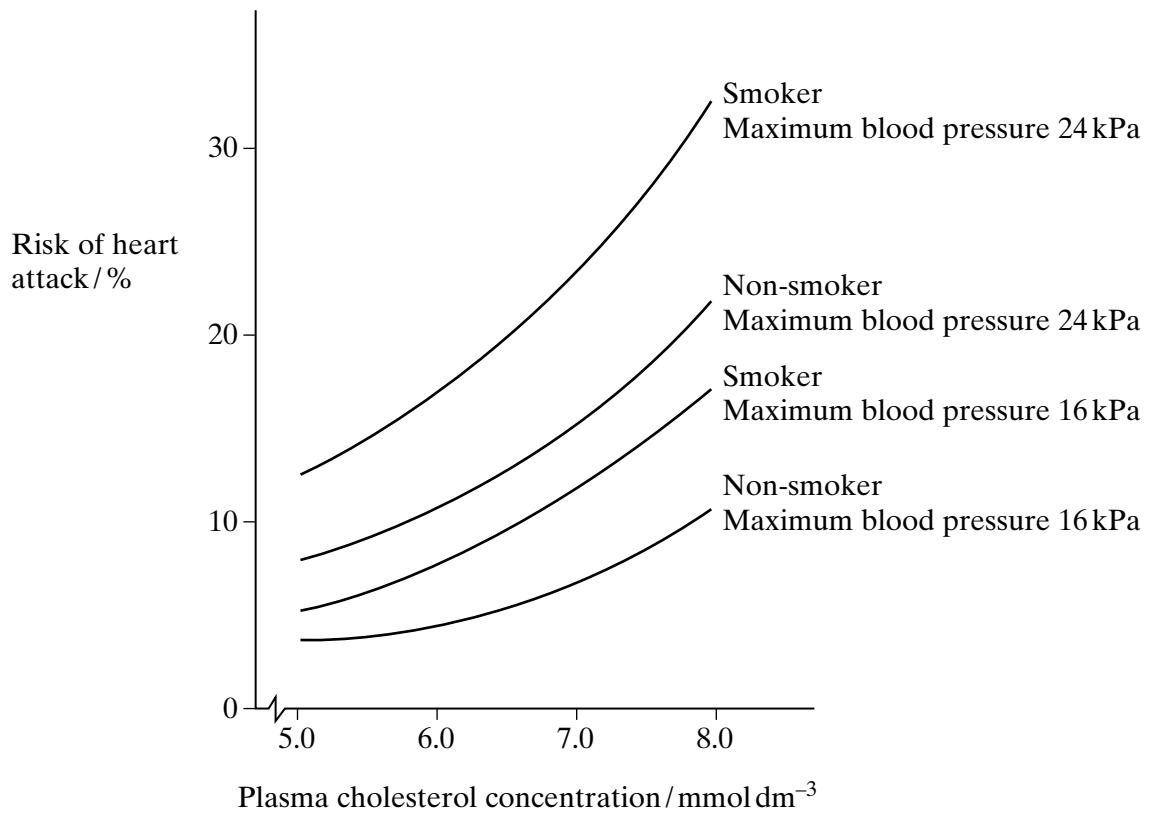
(2 marks)

5

TURN OVER FOR THE NEXT QUESTION

Turn over ▶

- 5 (a) The graph shows the risk of a 50-year-old male having a heart attack during the next ten years, in relation to several risk factors.



- (i) Describe what the graph shows about the effect of smoking on the risk of having a heart attack.

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(2 marks)

- (ii) Explain why an increase in plasma cholesterol concentration increases the risk of a heart attack.

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(2 marks)

- S** (b) Cigarette smoke contains nicotine. Nicotine stimulates the sympathetic nervous system and increases the stickiness of blood platelets.

Explain how these effects of nicotine increase the risk of cardiovascular disease.

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(4 marks)

8

TURN OVER FOR THE NEXT QUESTION

Turn over ▶

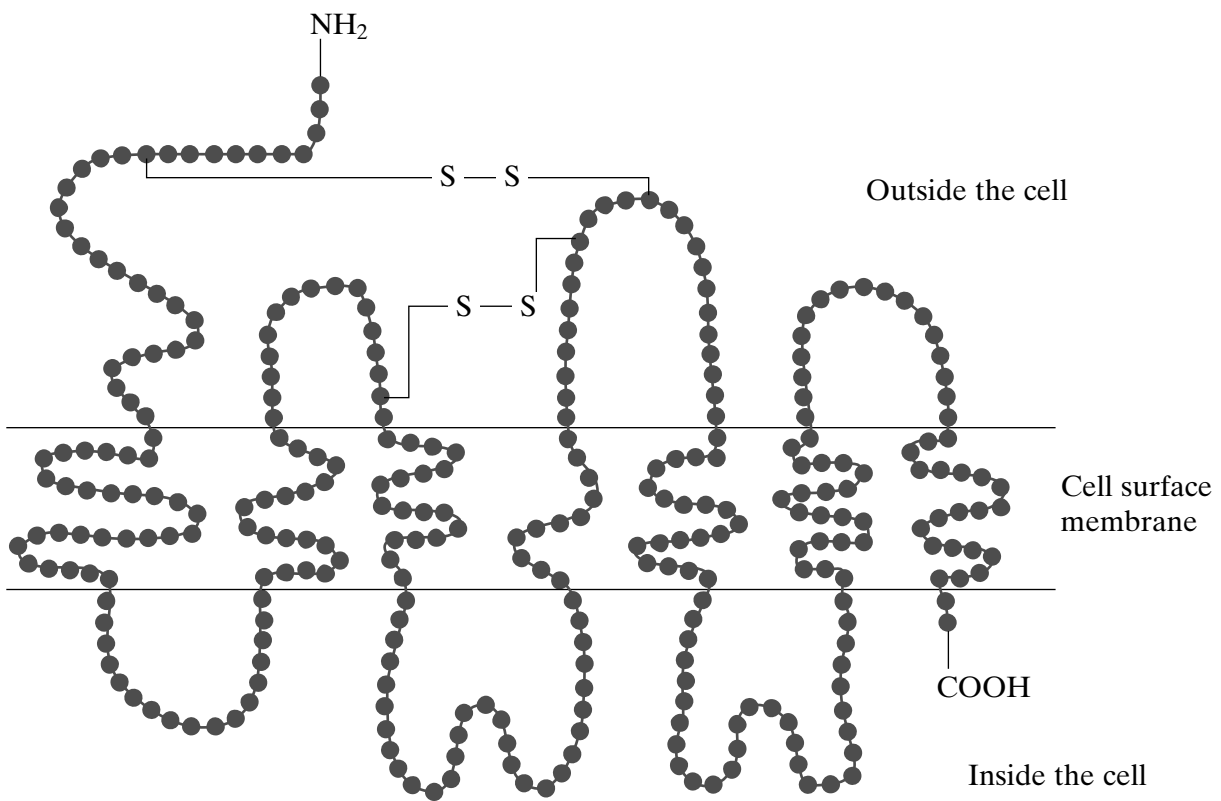
6 (a) Give **one** function of LH in females.

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(1 mark)

In males, FSH stimulates sperm production and LH causes the release of testosterone. A hormone stimulates the release of FSH and LH by attaching to receptor molecules in the surface membrane of cells in the pituitary gland. The diagram shows one receptor molecule for this hormone.



S (b) (i) Give **two** pieces of evidence from the diagram which suggest that the receptor molecule is a protein.

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(2 marks)

(ii) Explain how the tertiary structure of this protein is important for its function as a receptor molecule.

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(2 marks)

(c) Research has identified a substance which could be used as a male contraceptive pill. This substance binds to the receptor molecules in the pituitary gland and stops the release of FSH, but allows the release of LH to continue.

(i) Explain **one** advantage of the substance not inhibiting LH release.

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(2 marks)

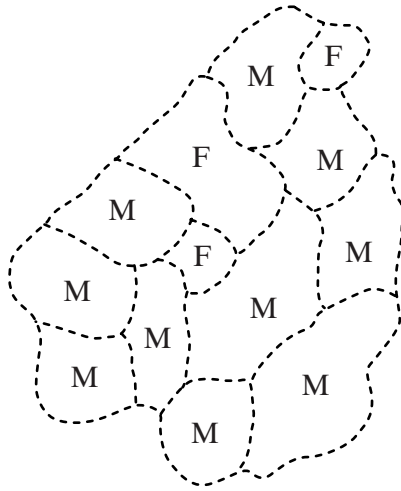
S (ii) This substance is not a protein. Explain why a protein could **not** be used as an oral contraceptive.

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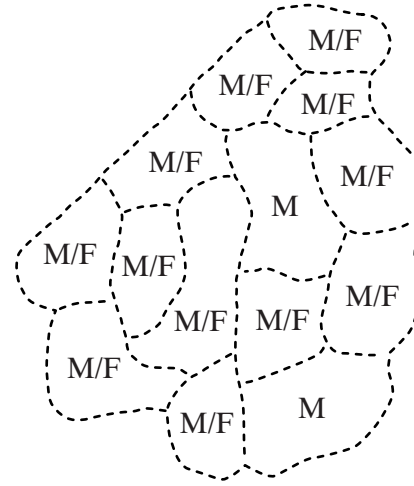
(2 marks)

Turn over 

7 The robin is a common bird which feeds on a wide variety of insects and fruit. Some robins are resident in Britain all year, and some migrate to Europe in the winter. The diagrams show the boundaries of the robin territories in a wood in December and the following April.



December



April

Key

- M = territory of male robin
- F = territory of female robin
- M/F = territory of pair of robins

(a) Describe and explain the differences in the occupation of the robin territories between December and April.

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(2 marks)

(b) Describe the functions of courtship in pair formation in birds such as robins.

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(3 marks)

S (c) Robins defend their territories against other robins by fighting and other aggressive behaviour. They do not show aggressive behaviour towards similar-sized birds of other species. Suggest how other robins are more of a threat to a robin’s breeding success than are similar-sized birds of other species.

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(3 marks)

S (d) The level of aggressive behaviour in the population during the breeding season remains approximately the same from one generation to the next. Aggressive behaviour is partly genetically determined. Explain how natural selection maintains a population of robins with a particular level of aggressive behaviour.

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(3 marks)

END OF SECTION A

SECTION B IS PROVIDED AS AN INSERT

THERE ARE NO QUESTIONS PRINTED ON THIS PAGE

ACKNOWLEDGEMENT OF COPYRIGHT-HOLDERS AND PUBLISHERS

Question 5: MRC Research Update No 9, 1997.

Question 6: MRC Research Update No 2, 1995.